

DISCUSSION GUIDE FOR “CLIMATE CHANGE AND ITS IMPACT”

a two-part video interview with Professor David Lobell and
Professor Marshall Burke, Center on Food Security and the Environment



Objectives During and after the viewing of “Climate Change and Its Impact,” students will:

- consider the significance of climate change;
- understand the meaning of food security;
- discuss the risks associated with climate change; and
- consider the impact of policies and technology on food security.

Materials Focus Cards: Climate, Food Security, Conflict, Economics, Policy, Technology, Government, Poverty, p. 4
Teacher Information 1, *Video Transcript for “Climate Change and Food Security,”* pp. 5–6
Teacher Information 2, *Video Transcript for “Climate Change and Conflict,”* pp. 7–9
Video, “Climate Change and Food Security,” 4 minutes 30 seconds; available at <http://spice.fsi.stanford.edu/multimedia/climate-change-and-food-security>
Video, “Climate Change and Conflict,” 8 minutes 33 seconds; available at <http://spice.fsi.stanford.edu/multimedia/climate-change-and-conflict>

Equipment Computer with Internet access and speakers
Computer projector

Teacher Preparation

1. Copy and cut the “Focus Cards,” making sure that there is at least one card for each student.
2. Set up and test computer, projector, speakers, and video before starting the lesson. Confirm that you are able to play the videos with adequate audio volume.

Procedures

1. Point out to students that in this two-part Scholars Corner video, Professor David Lobell and Professor Marshall Burke, Center on Food Security and the Environment (FSE), discuss climate change and its impact. In Professor Lobell’s words, FSE is concerned about “how to bring the billion people or so that are food-insecure today into a state of food security, and how to do that in a way that preserves the environment as best as we can.”
2. Begin the lesson by engaging students in a brief discussion about climate change. Some suggested discussion questions are provided below.
 - What have you heard in the news recently about climate change?
 - What are some of the risks associated with climate change?
 - What is being done to control climate change?
 - What is the connection between food security and the environment?
 - What impact do policies and technology have on food security?
 - What impact does conflict have on food security?
3. Inform students that they will now listen to scholars who will share their thoughts on the topic of climate change and its impact. Distribute one Focus Card to each student, making sure that there is fairly even distribution of the focus topics. Instruct students to jot down notes on their particular focus topic as they view the videos. Play the video “Climate Change and Food Security” first, then play “Climate Change and Conflict.” You may want to show the videos twice.
4. After the end of the videos, ask students with the same focus topic to gather as a group and to develop a one- to two-minute summary of its focus topic.
5. Have each group share its one- to two-minute summary. Allow other groups to ask questions after each presentation.
6. After each group has presented, have each group partner with one other group. Ask each group to discuss the following questions. Have each partner group develop a one- to two-minute summary of its discussion.
 - How are their focus topics related, if at all?
 - Do Professor Lobell and Professor Burke suggest linkages between the focus topics? If so, how? If not, what are some ways that they might be related?
 - Who are some groups that may be interested in these linkages?

7. Have each partner group share its one- to two-minute summary. Allow other groups to ask questions after each presentation.
8. As a whole class, discuss the following questions.
 - How are three or more of the focus topics related?
 - Do Professor Lobell and Professor Burke suggest linkages between multiple focus topics? If so, how? If not, what are some ways that they might be related?
 - Who are some groups that may be interested in these linkages?
9. Assign your students one or a combination of the following as a research topic. Their research essays can be used for assessment purposes.
 - How much should people care about climate change?
 - How is food security defined?
 - How is climate change impacting food security?
 - How will climate change impact food security in the future?
 - How well can scientists predict how climate change will affect food security?
 - What are the basic drivers of how food security is affected by climate change?
 - Which countries or governments have the most problems with climate change and food security?
 - Which countries or governments have seen the most improvement in addressing climate change?
 - What is the correlation between changes in the climate system and conflict?
 - Should governments or countries be concerned about the relationship between climate change and conflict?
 - What are some key technologies and policies related to food security? Are they going to help or hurt in terms of food security?
 - What are some ways that crops like corn, rice, wheat, and soybean—main sources of calories and protein around the world—are being affected by climate change, and what are some genetic possibilities with these crops?
 - How do changes in environmental conditions (like climate) affect both social and economic outcomes, e.g., food security, human conflict, as well as aggregate economic productivity?

FOCUS CARDS

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|---------------|---------------|---------------|---------------|---------------|
| Climate | Climate | Climate | Climate | Climate |
| Food Security |
| Conflict | Conflict | Conflict | Conflict | Conflict |
| Economics | Economics | Economics | Economics | Economics |
| Policy | Policy | Policy | Policy | Policy |
| Technology | Technology | Technology | Technology | Technology |
| Government | Government | Government | Government | Government |
| Poverty | Poverty | Poverty | Poverty | Poverty |

VIDEO TRANSCRIPT FOR “CLIMATE CHANGE AND FOOD SECURITY”

On-screen text:

Climate Change and Food Security
a discussion with David Lobell

On-screen text:

David Lobell
Deputy Director, Center on Food Security and the Environment

Professor Lobell: “Food security” is really just a fancy word for being confident that you know where your food is coming from, that you’re not going hungry, that you’re not uncertain where your next meal is coming from. The Center on Food Security and the Environment is really concerned about how to bring the billion people or so that are food-insecure today into a state of food security, and how to do that in a way that preserves the environment as best as we can.

Climate change is one of many factors that influence food security, and there are lots of different ways that it could influence it. The most obvious one is that agriculture everywhere still depends on the weather. As the weather shifts with climate change—and agriculture struggles to keep up with those changes—there’s certainly a potential for shortfalls in production, which could lead to increases in prices and difficulty in getting access to food.

In the work we’ve done in terms of climate effects on agriculture, one of the surprising things has been that the data pretty clearly show very strong temperature effects on crops. Often people think of rainfall as being really important in agriculture. That’s what I thought. It’s not unimportant, but what the data clearly show is that a lot of the reasons you see good production in cooler, wetter conditions is as much for the “cooler” part as for the “wetter” part. What that means is that—going forward, as the temperatures continue to warm and are likely to warm—in many cases, these [temperature] effects will really dominate the overall picture of what’s happening to agriculture, even if you had the same amount of rainfall, even if you had more rainfall. That’s not something that was fully appreciated by me or other people before.

What we really want to understand is: Are different policies or different technologies going to help or hurt, in terms of food security?

With climate change, we have a pretty good understanding now that additional climate change on top of what we already are committed to (because of all of the emissions of greenhouse gases that we’ve had)...we’re pretty confident that additional emissions on top of that would really not be a good thing for food security. Being able to say how much of a bad thing is harder.

We’re at a state where we understand pretty well the basic drivers of how food security is affected by climate change and the basic scenarios that may come to pass. A lot of [the scenarios] are based on the fact that most of the food-insecure are already in pretty hot areas, and as those areas get hotter and potentially drier, then there’s a challenge that these systems face.

The U.S. and the world are actually similar, in the sense that the crops that are most vulnerable in the U.S. are probably corn and wheat, and that’s a similar story throughout the world. In a lot of the world, the main crops are corn, wheat, rice, and soybean and different mixes of those. Those are the main sources of calories and protein around the world.

Rice and soybean have more of a tropical origin; they’re more suited to higher temperatures. So, generally speaking, what we see in the data is that those are less impacted than crops like

corn and wheat, which are often used to cooler temperatures or are already growing in fairly marginal conditions. They [corn and wheat] get hurt that much more.

I think the biggest gray area right now, or one we're really focused on, is looking at this question of "What can you do to adapt?" There are a lot of ideas out there about how you might change the crops, or how you might change the way we grow the crops, and how those might help reduce the impacts of climate change. But to really understand that, you have to understand a couple of things: (1) More specifically, what is happening in the crop itself as weather changes? (2) What are the genetic possibilities out there? What are the different shapes, sizes, colors, and all the different aspects of the different plants that might help? That's an area that people have been working on, but there's a lot more work that needs to be done.

VIDEO TRANSCRIPT FOR “CLIMATE CHANGE AND CONFLICT”

On-screen text:

Climate Change and Conflict
a discussion with Marshall Burke and David Lobell

On-screen text:

Marshall Burke
Center Fellow, Center on Food Security and the Environment

Professor Burke: My main research is on the relationship between changes in environmental conditions (things like climate, which David talked about) and how those changes affect both social and economic outcomes we care about (things like food security, but also human conflict as well as aggregate economic productivity—the total amount of stuff that economies make). That’s what I study.

The way it fits into FSE’s (the Center on Food Security and the Environment’s) agenda? It’s central to that agenda. FSE is looking at relationships between food security (which is a social and economic phenomenon) and the environment more broadly. My research is right at the intersection of those two things.

On-screen text:

David Lobell
Deputy Director, Center on Food Security and the Environment

Professor Lobell: At Stanford and in the Center on Food Security [and the Environment], we’re trying to think more broadly about food and food security than just a traditional view, which [focuses] on agriculture, production, and farmers. There are a lot of aspects to that, but one of the key [aspects] is looking at poverty: looking at all of the things that make poor people, on the one hand unable to afford food, on the other hand unwilling to make investments, take on risks that would otherwise make them better off. Things like conflict are a major issue there.

There have been estimates that about half of the food-insecure people in the world are living in areas of some sort of violent conflict, and that’s underlying a lot of their food insecurity. A lot of the work Marshall does is really bringing in a lot of different dimensions of food security that we don’t traditionally think of as food security issues.

Professor Burke: We look at all types of conflict. We throw a lot of things into the “conflict” bucket—everything from the civil wars that you read about in Sub-Saharan Africa (a sort of group-level conflict) down to individual-level conflicts, e.g., aggravated assault and murder in the U.S. We also look at more mundane types of conflict—things you wouldn’t normally think of. We look at violence in baseball, for instance.

What we’ve done in our research is go back and assemble all the data sets we can that look at the relationship between some sort of climate variable (typically, changes in temperature or precipitation) and some sort of conflict outcome (e.g., anything from civil wars in Africa to aggravated assault on the streets of American cities). What we find when we look at these data—looking all around the world and back through large portions of time—we see this very strong relationship between changes in the climate system and these different types of conflict. In particular, the strongest relationship is between changes in temperature and changes in these types of conflict. What we see is [that] relatively small increases in temperature can have large

effects and can cause large increases in the likelihood of civil wars or the likelihood of murders in American cities.

Professor Lobell: One of the things that Marshall's work has helped to show—and this has been across a spectrum of studies, not just Marshall's—there's really a surprising amount that changes even for a degree warming of temperature. [That's] something we didn't appreciate. We've started thinking about it more because of global warming. But even without global warming, there's a tremendous amount of small effects that add up when you talk about even something like a degree of warming, which most people would barely notice on a day-to-day basis.

Professor Burke: What we see in the data and the way we study this is we take a given place on the globe and we get data for that place going back through time. The way we study the relationship between changes in temperature and conflict in that place is we compare the place on a normal day to the place on a really hot day, and see how conflict differs on those two different days. It really is comparing the same place over time.

When you study a question like climate and conflict, we know many, many things affect the likelihood of conflict. Climate might only be one of these things. But in this research project we're focusing on the actual contribution of climate to conflict. When we do that, we're not saying that these other things don't matter. All we're trying to do is identify the role that climate might or might not play in these different settings. What's frustrating—and the misperception that we run into sometimes—is the fact that you've just looked at those things [i.e., climate factors] somehow seems to imply that you're saying it's the most important cause. That's never what we're saying. The goal of these studies is just to measure: How important of a cause is it? Is it something we should care about or is it not?

Our research approach? You don't want to compare Norway and Nigeria. We know Norway is cool, and we know Norway is also pretty peaceful. We know Nigeria is hot and [that] Nigeria's also seen a lot of conflict lately. We know there are very many ways in which Norway and Nigeria differ, and they also have different rates of conflict. They differ in temperature, and they differ in all these other ways. We don't want to attribute all the differences in conflict just to differences in temperature. We know there are a lot of other things going on.

One of the audiences for this research is policymakers who are interested in the question of “How much should we care about climate change, and how much should we be investing in reducing future climate change?”

A second audience—and an audience where we've gotten a lot of interest and traction—is the military audience. The U.S. military has been very interested in these results. They're in charge of peacekeeping operations and various military operations around the world, so any driver [of conflict] that might change in the future and increase these conflicts...is going to be important to them. They've been way out in front on this issue.

I think governments are starting to look at this relationship between climate and conflict as a potential threat and something they should pay attention to. We were actually very surprised about how strong and consistent the relationship was when you look across all these different data sets—across all of these different countries and back through time. I don't think anyone had really realized how strong the relationship was. Our hope is that this sort of research will bring this to the attention of people who care about it and can actually do something about it, e.g., folks in the U.S. military and policymakers interested in climate.

Professor Lobell: The traditional national security type of community that FSI and Stanford has interacted a lot with are definitely interested not only in the chance for conflict and more conflict around the world, but also for humanitarian issues, because they are often on the front lines of dealing with humanitarian issues that [stretch] their resources. So they are hugely interested in things like food security, not just because it might spill into local unrest and instability, but just because it then is that much more of a burden on the global community. They are taking a very serious look at the results that come out, and also the ideas about how to be proactive.

One of the things that we often ask ourselves is [why] we work on such depressing topics. Hunger is not enough; we have to work on violence and all the suffering that goes on in the world. But the motivation is to try to understand better what the risks actually are, so we can respect the problem if it's a serious problem, and people can understand that. If climate change is going to credibly lead to these big risks, then we have to rethink how we commit to these changes in climate. But even more than that, I think it's to try to understand the nature of these impacts. In the case of crops, for example, what are the crops doing? Or in the case of conflict, what are the mechanisms by which a change in climate would affect conflict? And then you can think about (with people who work on these issues) how do you actually adapt, and how do you remove those impacts. That's the more optimistic way of looking at it. Of course, anytime we write a study and it gets published, it's always about "bad things are going to happen." It's really not the reason that we do it—to try to predict that bad things will happen. But if that is what the data are saying, we are not to pretend otherwise.